In the United States Court of Federal Claims

No. 09-672C

(Filed: September 7, 2012)

BPLW ARCHITECTS & ENGINEERS, INC., Plaintiff, v. THE UNITED STATES, Defendant.	Air Force and Army Corps of Engineers Dormitory Construction Project; Government Breach of Contract Claim; Architect's Negligent Subsurface Piping and Civil Site Grading Designs; Failure to Prove Causation and Reasonableness of Damages Claims; Recovery of Costs of Implementing Design Modifications.

Gregory N. Ziegler, with whom was *Alexander G. Blue*, Macdonald Devin, P.C., Dallas, Texas, for Plaintiff.

P. Davis Oliver, with whom were *Stuart Delery*, Acting Assistant Attorney General, *Jeanne E. Davidson*, Director, *Franklin E. White, Jr.*, Assistant Director, *Shelley D. Weger*, and *Kenneth D. Woodrow*, Trial Attorneys, Commercial Litigation Branch, Civil Division, U.S. Department of Justice, Washington, DC, for Defendant.

OPINION AND ORDER

WHEELER, Judge.

The Government contracted with BPLW Architects & Engineers, Inc. to provide architectural and engineering services for the construction of two student dormitory buildings at Lackland Air Force Base in San Antonio, Texas. Shortly after the general contractor, CF Jordan, finished construction of the dorms, below grade piping problems occurred, resulting in the flooding of several dorm units. The Government contracted with CF Jordan to repair some of the broken pipes and with another contractor, Tepa EC, LLC to replace the entire subsurface piping system and to remedy the inadequate grading around the dorms.

The Government claims that BPLW provided a negligent underfloor piping design, as the design failed to accommodate the "highly expansive" soils in the San Antonio area. In addition, the Government claims that BPLW provided a negligent civil site grading design, as it did not provide for the requisite five percent slope away from the dorms. The Government contends that these negligent designs caused the piping problems at the dorms and led it to incur substantial expense to repair broken pipes, replace the underfloor piping system, and remedy the site grading. For its damages, the Government claims a total of $6,755,826.72 from BPLW.

The Court has jurisdiction of this matter under the Contract Disputes Act, 41 U.S.C. § 7104(b) (2006) ("CDA"), on appeal from the contracting officer's November 25, 2008 final decision wherein the Government claimed more than $7.6 million in damages from BPLW for negligent design. BPLW timely filed its petition in this Court on October 7, 2009. The Court conducted trial in Fort Worth, Texas from February 27 through March 7, 2012, and heard the testimony of eighteen witnesses, eight of whom were experts. The Government presented its case first because it had the burden of proof to substantiate its claim. Following trial, the parties submitted post-trial briefs on May 17, 2012, and post-trial response briefs on June 18, 2012. The Court heard closing arguments on July 16, 2012 in Washington, DC.

As set forth below, the Court finds that BPLW did indeed provide negligent underfloor piping and civil site grading designs, as both failed to comply with the contract requirements and the applicable standard of care. The Court also finds, however, that the Government failed to establish that these negligent designs caused either the initial pipe breakage ultimately repaired by CF Jordan or the inadequate site grading remedied by Tepa. In addition, the Court finds that irrespective of causation, the Government failed to prove the reasonableness of the costs it paid to Tepa to replace the underfloor piping system. The Court therefore concludes that BPLW is liable to the Government for $197,596.47 in costs the Government incurred to implement certain modifications to BPLW's designs, but that the Government is not entitled to the other damages it claims.

Factual Background[1]

I. The Contract – December 2002/January 2003

The United States Air Force hired the United States Army Corps of Engineers, Fort Worth District ("the Corps") as the contracting agency to procure the design and construction of student dormitories on Lackland Air Force Base ("AFB") in San Antonio,

[1] This Factual Background section comprises the Court's principal findings of fact under Court Rule 52(a). Other findings of fact and rulings on mixed questions of fact and law are set forth later in the Discussion.

Texas. Stip. ¶ 1.[2] Plaintiff, BPLW Architects & Engineers, Inc. ("BPLW") is an architectural and engineering firm headquartered in Albuquerque, New Mexico. Id. ¶ 2; Compl. ¶ 2. On or about December 17, 2001, BPLW and the Corps entered into an "Architect-Engineer Contract," No. DACA 63-02-C-001 ("the Contract"), under which BPLW agreed to design student dormitory "FY03" at Lackland AFB. Stip. ¶ 3; DX 3. On or about January 14, 2003, BPLW entered into a modification of the Contract to design student dormitory "FY04," which is adjacent to the FY03 dormitory at Lackland AFB. Stip. ¶ 4. After modifications, the Contract amounted to $1,869,252.80. Id.

BPLW provided structural engineering and mechanical, electrical, and plumbing ("MEP") engineering services as part of its Contract with the Corps. Stip. ¶ 7. The Contract's Statement of Work specified that the Government would supply BPLW with "a report to define soil conditions at the site and paving and foundation requirements as may be applicable." Id. ¶ 6; DX 12 at 12. In line with this provision, the Corps provided the geotechnical engineering services for the project and prepared the foundation and pavement design analyses ("the soils reports"), dated May 2002 and July 2003, for the FY03 and FY04 dorms, respectively. Stip. ¶ 8; see PX 5; PX 6. The two soils reports are the same in all substantive respects. Compl. ¶ 13; see PX 5; PX 6. BPLW was obligated under the Contract to follow the soils reports in preparing the structural and MEP designs[3] for the dorms. Stip. ¶¶ 11, 14.

A. The Soils Reports

Mark Black, a geotechnical engineer and assistant chief of engineering in the Corps' Fort Worth District, authored the FY03 soils report, Tr. 56, 59, 61 (Black), and Ken McCleskey, acting chief of the Corps' geotechnical section, authored the FY04 soils report, Tr. 583-84, 589 (McCleskey). Mr. Black and Mr. McCleskey prepared the soils reports based upon their respective subsurface investigations and subsequent laboratory testing of samples obtained from the dorm sites. See Tr. 69-72 (Black), 593 (McCleskey). The principal finding of both Mr. Black and Mr. McCleskey was that the soil at the site of the dorms had a very high "shrink swell potential," see Stip. ¶ 17; Tr. 74

[2] "Compl." refers to BPLW's Complaint filed October 7, 2009; "Stip." refers to the Joint Stipulation of Undisputed Material Facts filed January 23, 2012; "PX" refers to BPLW's Trial Exhibits; "DX" refers to the Government's Trial Exhibits; "Tr." refers to the transcript of the trial proceedings in Fort Worth, Texas; "Pl.'s Br." refers to BPLW's Opening Post-Trial Brief filed May 17, 2012; "Def.'s Br." refers to the Government's Post-Trial Brief filed May 17, 2012; "Pl.'s Resp." refers to BPLW's Response to the Government's Post-Trial Brief filed on June 18, 2012; and "Def.'s Rep." refers to the Government's Reply to Plaintiff's Post-Trial Brief filed on June 18, 2012.

[3] Throughout this Opinion and Order, the "structural" design refers principally to the foundation design for the dorms, see Tr. 2060 (Esmond), while the "MEP" design refers to the underfloor piping design for the dorms.

(Black), 594-95 (McCleskey), or in the words of Mr. Black, that the soil was "extremely highly expansive," Tr. 74. The soils reports reflect this finding, noting that "[o]nce built upon these soils can experience significant volumetric changes when their in situ moisture environment is altered." PX 5 at 8; PX 6 at 9. Specifically, both soils reports state that "the expansive soils have a heave potential" of more than nine inches. PX 5 at 8; PX 6 at 8.

In light of the expansive soil, the soils reports direct that "the presence of a highly active subgrade must be accounted for in the design of the Dormitory foundation and floor slab systems to prevent both functional and aesthetic problems within the completed facility." PX 5 at 9; PX 6 at 9. To account for the highly active subgrade, the soils reports specifically recommend a foundation system consisting of a drilled and underreamed pier foundation with a 12-inch void space under the floor slab. PX 5 at 9-10; PX 6 at 9-10. The drilled and underreamed pier foundation prevents the building from moving, regardless of soil heave. See Tr. 574 (Focht). As the Government's expert, John Focht III,[4] explained:

> All of the structural loads come down to a series of drilled concrete piers that are embedded at about 35 feet, and so the load carries down through the portion of the soil that's shrinking and swelling, and it is resting down in some materials that don't move. As a result the structure is not moving, so as the soil goes up and down the building is largely staying in place.

Id. The 12-inch void space under the floor slab prevents the soil from coming into contact with, and pushing up on, the building floor whenever the soil expands. See Tr. 81 (Black).

The soils reports do not provide explicit guidance for the design of the underfloor piping system. Tr. 94 (Black); see generally PX 5; PX 6. The soils reports do, however, contain a section entitled "Mechanical Connections," which states that "[a]ll exterior mechanical connections should be of the flexible type. Flexible connections should be capable of resisting a minimum of 25 millimeters [approximately 1 inch] of both vertical and horizontal movement. All condensate lines should drain away from foundation edges." Stip. ¶ 19; PX 5 at 17; PX 6 at 19.

The soils reports also indicate that "proper drainage is an important design consideration to ensure satisfactory long-term foundation performance." Stip. ¶ 18; PX 5 at 16; PX 6 at 18. Specifically, the soils reports recommend that exterior grading adjacent to the dorms should be sloped away from the structures a minimum of five

[4] Mr. Focht is a chief geotechnical engineer for the consulting firm Raba-Kistner Consultants, Inc. Tr. 481 (Focht).

percent for the first three meters, runoff should be adequately discharged away from the foundation edges, and in no case should water be allowed to pond adjacent to or beneath the buildings, both during and after construction. Stip. ¶ 18; PX 5 at 16; PX 6 at 18.

B. The AEIM

The Contract required BPLW to incorporate into its design the technical considerations set forth in the "US Army Corps of Engineers, Southwestern Division, Architectural and Engineering Instructions Manual (CESWD-AEIM), October 1998" ("the AEIM"). DX 12 at 8. Mr. Black called the AEIM "the Bible for . . . an in-house or an A-E designer," as it provides the guidance designers must follow and the minimum requirements for a design submittal. Tr. 87.

During the trial of this case, the Government offered, and the Court admitted into evidence, the 2000 edition of the AEIM. See Tr. 88-89; DX 3 at 1. Chapter 1 of this edition provides that its purpose is to "provide general design guidance to Architect-Engineers (A-E's) working as design agents providing services, designs, construction drawings and specifications pursuant to a contract with Corps of Engineers District offices located in the Southwestern Division." DX 3 at 4. Chapter 5 directs that "[i]n areas where expansive soil conditions exist, comply with expansive soil criteria." Id. at 208. Section 2.1.5 states, "Piping designs for underfloor piping in expansive soils will be in accordance with SWDED-G letter [d]ated 29 Sep 1983, ER 1110-345-722" ("the 1983 letter"). Id. at 180.

In addition, Section 2.2.3 of this edition provides that for "[t]urfed [a]reas" adjacent to a building, "[o]utside finished grade will slope away from the building at a 5% grade for the first 3 meters." Id. at 21. "[I]n areas with highly expansive soil," the AEIM recommends that the "5% grade should be extended to 6 to 9 meters." Id.

C. The 1983 Letter

As noted above, the 2000 edition of the AEIM directs piping designers to comply with the September 29, 1983 letter, which sets forth proper design methods for areas with expansive soils. Stip. ¶ 20; see generally PX 1. The 1983 letter provides that:

> Experience has shown that a potential problem exists with leakage of water and waste lines . . . when the lines are buried in expansive soil. Access of free water to expansive foundation soils from broken and/or ruptured water and waste lines has resulted in foundation problems and on occasions excessive distress to structures. Special precautions to isolate these utility lines from expansive soils have reduced considerably the number of foundation problems.

PX 1 at 1.

The 1983 letter further notes that "[t]reatment of water and waste lines will vary with the type [of] foundation system selected for the building." Id. The letter then presents what it calls "the four basic foundation types" (a through d), along with the "utility line treatment" corresponding to the foundation type. Foundation type (b), "[s]pot footings . . . and grade beam with structural slab over a 6-inch void," is "identical" to the foundation type recommended in the soils reports, except that the soils reports recommend a 12-inch void under the grade beams, rather than the 6-inch void recommended in the 1983 letter. Tr. 153 (Black); see also PX 5 at 14. In conjunction with this foundation type, the 1983 letter recommends the following piping system:

> [w]ater and waste pipes should be supported from the floor system in a localized crawl space area under the interior of the building and from the grade beam where the pipes exit the building. A void area of 6-inch minimum should be provided beneath the supported pipes. These pipes should have flexible connections on the exterior side of the grade beam. The connections should be accessible for maintenance. This will allow some differential movement to occur between the building foundation and the swelling soils outside the limits of the building without damaging the pipes.

PX 1 at 2.

II. BPLW's Piping Design

In compliance with the recommendation in the soils reports, BPLW's structural design provided for a drilled pier foundation on a structural slab over a 12-inch void, i.e., a structural slab over a 12-inch void space. Tr. 84 (Black); Compl. ¶ 18. Based upon the structural design, BPLW's MEP engineers then designed the underfloor piping system. See Compl. ¶ 18. BPLW's mechanical design for the underfloor piping system called for burying the plumbing lines directly in the expansive soil within a trench bedded and backfilled with select fill. Pl.'s Br. 1, 16.

A. Modifications to BPLW's Piping Design – August 2003

BPLW's original piping design called for the use of cast iron pipe but was later changed to use PVC pipe. See Tr. 2344-46 (Bray). In August 2003, however, BPLW "discovered" that the soil under the dorms had a high swell potential and informed the Corps that it would need to modify its design. PX 22. In an email dated August 11, 2003 from Richard Bray, BPLW's project manager, to Bobbi Farrell, a construction

coordinator for the Corps, Mr. Bray stated that it "[s]eems our structural and civil engineers have dealt with the highly expansive soil on the site, but it slipped past our mechanical (plumbing) engineers . . . they don't normally have to deal with that issue." Id. In the email, Mr. Bray indicated that expansion fittings should be added to the PVC pipe to address the soils' swell potential. Id. He noted that while "I doubt even cast iron will handle 8 [inches of heave] . . . [t]he rigid glued PVC pipe will not handle any movement at all." Id. Ultimately, BPLW did not incorporate expansion fittings but instead modified its design to: (1) use cast iron with hub and spigot joints instead of PVC for the pipes; and (2) reroute the main sewer line to the exterior of the building. See Tr. 2066-67 (Esmond); Tr. 2346-47, 2351-53 (Bray); PX 23; PX 27; Tr. 415-17 (Branson); Tr. 1619 (Sanford).

Even after the implementation of BPLW's design modifications, there were still horizontal runs under the dorms. Tr. 418-19 (Branson). Moreover, after the modifications, it is undisputed that BPLW's design could not accommodate nine inches of heave, as anticipated in the soils reports. BPLW's expert, MEP engineer Jack Esmond, testified that BPLW's design, incorporating the cast iron pipe with hub and spigots, could withstand one to one and a half inches of movement where the pipe runs vertical and turns horizontal and up to four or five inches where the pipe runs horizontal away from the vertical turn. Tr. 2068-69 (Esmond). Similarly, an expert for the Government, consulting engineer James Branson, opined that BPLW's design was "typical of a design that would accommodate an inch or less of movement." Tr. 440.

B. Costs of the Modifications to BPLW's Piping Design

To implement BPLW's design changes, the Corps issued two modifications to CF Jordan's contract. First, on August 26, 2003, the Corps issued CF Jordan a notice to proceed and modification P00003 in the amount of $75,000. See DX 28; PX 70 (modification P00003). This change provided CF Jordan with immediate funds to begin implementing the modification. See Tr. 1620 (Sanford). After the Corps determined the total cost of the modification, it issued a second modification (P00008) on February 18, 2004, increasing CF Jordan's contract by an additional $122,596.47 for a total modification increase of $197,596.47. PX 70 (modification P00008); Tr. 1620 (Sanford).

III. BPLW's Site Grading Design

BPLW also provided a civil site grading design for the areas surrounding the dorms. The parties agree that BPLW was contractually obligated to strictly follow the soils reports in preparing its design. Stip. ¶ 11. BPLW's civil site grading design called for "positive slope" around the perimeter of the dorms. Def.'s Br. ¶ 107.

IV. Construction of the Dorms – August 2003 to November 2006

The general contractor CF Jordan was responsible for the construction of the dorms, Stip. ¶ 22, and the Corps was responsible for site observation, Compl. ¶ 23. CF Jordan completed construction of the FY03 dorm in August 2005 and construction of the FY04 dorm in November 2006. PX 4 at 3; PX 70. During construction of the dorms, CF Jordan failed to grade the site with positive grading and drainage to carry water away from the building. Stip. ¶ 24. CF Jordan also allowed post-rain ponding and pooling of water around the foundation perimeter. Id. ¶ 23. BPLW played no role in supervising or overseeing CF Jordan's construction work. The Corps supervised CF Jordan's construction work.

V. Problems with the Dorms

A. Problems with the Piping Beneath the FY03 Dorm – September 2005

The Air Force began having problems with the utility lines underneath the dorms on September 15, 2005 when the FY03 dorm's sanitary sewer lines backed up, flooding four living units in the east wing of the building via the shower, toilet, and sink. Stip. ¶ 21; DX 45 at 3. The Air Force tasked CF Jordan with identifying and fixing the cause of the problems. DX 45 at 3. CF Jordan made an excavation under the problem areas to expose the sanitary sewer pipe network. Id. CF Jordan then hired Rimkus Consulting Group, Inc. ("Rimkus") as a mechanical engineer, which inspected the site in late December 2005 and summarized its findings in a report dated January 12, 2006.[5] Id.

Rimkus Findings – December 2005

Rimkus determined that during installation, CF Jordan had bent and broken a pipe component, which was then installed under four living units (E102-05) in the east wing of the FY03 dorm, id. at 3, 6; see also Tr. 605 (McCleskey), and Rimkus attributed additional pipe damage to soil heave, DX 45 at 3. In addition, Rimkus determined that during its investigation of the clogged plumbing lines, CF Jordan had permitted grout mortar cuttings from the bathroom tile installation to be washed down the bath drains, thereby clogging the traps. Id. CF Jordan then used high pressure water jets to clean out the grout material from the piping. Id. at 3.

[5] The Court did not admit this report into evidence, see Tr. 432-33, 757-59, 960, because the Government failed to disclose its author, Steven A. Frase, as a potential witness in a timely manner, and Frase was therefore precluded from testifying at trial as to the report's contents, Dkt. No. 80 (Order dated February 9, 2012). However, the Court allowed other witnesses to testify as to their interpretation of the photographs attached to the Rimkus report. See Tr. 432-33, 757-59, 960. The Court applied the same treatment to a report authored by Dean Alderson. See Dkt. No. 80. The findings from the Rimkus report included below are drawn from a later report written by Mr. McCleskey, as well as from Mr. McCleskey's testimony at trial. See DX 45.

B. Problems with the Piping Beneath the FY04 Dorm – April 2006

In April 2006, similar back-ups of the sanitary sewer lines began to occur in the adjacent cluster of four living units (E106-09). Id. at 4. During the plumbing investigation, high levels of grout were observed in the pipes. Id. CF Jordan again excavated under the problem units and hired Rimkus to inspect the plumbing in that area. DX 45 at 4. Rimkus observed distortions and several fractures in the underfloor plumbing, including one section of vertical pipe that had become sheared and vertically offset by two to three inches. Id. In addition, Rimkus observed that the carton forms under the building floor slab had been crushed, reducing the original 12-inch void space by at least four to six inches. Id. Rimkus attributed the pipe damage and the reduced void space to heaving soil conditions. Id.

Mr. McCleskey's Report – July/August 2006

In a letter dated July 27, 2006, CF Jordan formally notified the Corps of the problems with the dorms, attributing them to the expansive soils underneath the dorms. Id. at 4-5. On July 31, 2006, the Corps' Project Quality Assurance Inspector at the Lackland Resident Office, Bill Reese, requested that a representative of the Corps' Geotechnical Section conduct a site visit to inspect the plumbing allegedly displaced by heaving soils. Id. at 1, 5. In response, Mr. McCleskey conducted a site visit on August 2, 2006 and memorialized his observations in a report dated August 17, 2006. See DX 45.

Upon his arrival, Mr. McCleskey spoke with Messrs. Reese, Mitchell, and Painter, all of whom accompanied him to the site. Id. at 5. Mr. Reese reported to Mr. McCleskey that CF Jordan had allowed water from high-pressure jets to flow into the underfloor excavation and had left the excavation open, allowing water to accumulate, for approximately six months beginning in September 2005. Id. at 3; Tr. 606 (McCleskey).

When he visited the excavations adjacent to living units E106-09, Mr. McCleskey observed approximately six to eight inches of standing water at the base of the excavations. DX 45 at 5. Mr. Reese told Mr. McCleskey that CF Jordan had allowed the water to accumulate in the underfloor excavations for over two months. Id. Mr. McCleskey observed other potential sources of moisture, including "profusely dripping condensate outlets" and "poorly graded areas next to the building." Id.; Tr. 599 (McCleskey). Due to the standing water, Mr. McCleskey was unable to access the underfloor area to inspect the condition of the piping and the magnitude of heave during his site visit. DX 45 at 5.

Mr. McCleskey also inspected a damaged pipe in living unit N117 of the FY04 dorm. Id.; Tr. 599 (McCleskey). Based upon his observations, he testified that it had been "cracked and broken through heat-related and vertical displacement . . . of

approximately one-half inch." DX 45 at 5; Tr. 599 (McCleskey). He also observed standing water north of living unit N117 and was told by Mr. Reese that CF Jordan had permitted the water to accumulate in the area for approximately 18 months. DX 45 at 5-6.

Based upon his review of the Rimkus report, as well as his site visit and discussions with Corps personnel, Mr. McCleskey concluded that the pipe broken during installation by CF Jordan "apparently developed a clog that resulted in the sanitary sewer plumbing backups noted in September 2005." Id. at 6; Tr. 605-06 (McCleskey). He surmised that water from the broken pipe, as well as water from the high-pressure jets used to clean out the pipe, would have contributed to the moisture in the underlying soil. DX 45 at 6.[6] Furthermore, he surmised that this water could have migrated, inducing soil heave under living units E106-09, which are downhill from units E102-05. Id. at 7.

At the FY04 dorm, Mr. McCleskey surmised that it was "highly possible that the water the Contractor permitted to accumulate within the drainage ditch, over time, raised" the moisture content of the soils, which would have resulted "in the vertical displacement of the water pipe [in] living unit N117." Id. at 9.

C. Problems with the Grading Surrounding the Dorms

During his site visit in August 2006, Mr. McCleskey observed standing water and poor drainage away from the buildings, which he surmised could have been another contributor to the elevated moisture content of the soils in the area. Id. at 6-7; Tr. 599 (McCleskey).

Poor drainage was observed during at least two other site visits. In 2007, the Government hired a consulting engineering firm, K.M. Ng & Associates, Inc. ("Ng"), to assess the existing field conditions associated with the design and construction of the dorms. See PX 4 at 2; Tr. 122 (Black). Based upon field observations, a geotechnical investigation, topographic survey, and review of the construction documents and design criteria in the 2000 version of the AEIM, Ng provided the Government with a report in September 2007. See PX 4. Ng's report concluded: "What can be physically documented is the poor drainage construction around these buildings and surrounding walks, swales, landscape area, and trench drains. A combination of both sites' construction, together with nonconformance to the AEIM and/or [soils reports] has magnified these problems." Id. at 23.

[6] Mr. McCleskey testified that CF Jordan "conveyed" to him: damaged pipe during installation; permitted grout to be washed down the drains; used high pressure jets to clean out the pipes; allowed that water to flow into the excavations; and left parts of the excavations open for months at a time. See Tr. 605-09. Mr. McCleskey did not have first-hand knowledge of any of these issues but instead, obtained the information from Mr. Reese. Tr. 606, 614-15 (McCleskey).

Ng also noted that:

> [t]he most notable nonconformance between the Contract Drawings and existing conditions appears to be with the site grading and surface drainage. The spot elevations indicate that for the most part the finished floor elevations for the [dorms] . . . have been constructed very close to allowable standards. The major discrepancies are with the surrounding site grading which does not conform to the elevations indicated on the Contract Grading Plans.

Id. at 12. The report then shows a picture allegedly depicting the "finished grade adjacent to the foundation [of the FY03 dorm] approximately 5 inches above the elevations indicated on the drawings (a typical condition)." Id. at 12. As construction of the dorms was finished in August 2005 and November 2006, see DX 45 at 3; PX 70, the Ng survey did not provide information regarding the as-built conditions, Tr. 825 (Long).

In addition, in November 2007, Mr. Black asked Wayne Long, a resident engineer in the Corps' Jacksonville District, to investigate drainage issues, primarily around the FY04 dorm, and to prepare a corrective action design. Tr. 818-19, 821-22 (Long). During his site visit, Mr. Long observed pooling around the building and surmised that there was a grading problem. Tr. 821. Consequently, he concluded that he needed a topographical survey of the area, which he received in December 2007. Tr. 821, 825, 844 (Long); DX 50; PX 8.

Mr. Long also conducted an analysis comparing BPLW's civil site grading design with the grading requirements in the 2000 version of the AEIM. Tr. 825 (Long). In a memorandum dated November 24, 2008, Mr. Long concluded that in many areas, BPLW's design grades failed to adhere to the AEIM requirements. See DX 67; Tr. 837, 856 (Long). Specifically, he testified that "BPLW did not provide the .3 meter drop outside of . . . the building [or] . . . the 5 percent grade six to nine meters beyond the building." Tr. 837 (Long); see also DX 65; DX 67. Mr. Long ultimately produced drawings, which were used to correct the drainage issues. Tr. 838-40 (Long); DX 53.

VI. Costs to Repair the FY03 and FY04 Dorms

As a result of the piping and grading problems discussed above, the Corps entered into contracts to fix certain broken pipes, replace the piping system underneath the dorms, and remedy the grading surrounding the dorms. CF Jordan and Tepa EC, LLC ("Tepa") performed most of the repairs.

A. Costs Paid to CF Jordan and Mustang General Contracting

In May 2007, CF Jordan filed a claim in the amount of $21,103.44 for costs it incurred to repair a break in the chilled water line at Cooling Tower 2 and associated dorm room repairs. See PX 63; PX 70. After the Government concluded that BPLW was at fault for the break in the chilled water line, see PX 70 (0399), William Sanford, a civil engineering technician in the Corps' Fort Worth District, negotiated a settlement of CF Jordan's claim, see PX 63; Tr. 1419 (Sanford). On August 13, 2007, the Corps issued modification P00056 to CF Jordan's contract in the amount of $21,404.00, which includes the settlement amount plus CDA interest. See PX 70 (0411).

On July 11, 2007, CF Jordan submitted a claim to the Corps seeking reimbursement for the costs it incurred in repairing a sewer line under the FY03 dorm. See DX 47 at 1, 33. The Government "determined that BPLW's failure to account for heaving soil in their design caused the sewer pipes to break," PX 70, and thus, that settlement of CF Jordan's claim was appropriate, Tr. 1415 (Sanford). Mr. Sanford subsequently negotiated a settlement with CF Jordan for a total of $114,046.00. Tr. 1415 (Sanford).

On July 20, 2007, the Corps issued to Mustang General Contracting an "Order for Supplies and Services" in the amount of $57,406.65 for the immediate repair of a second broken lateral sewer line. Def.'s Br. ¶ 128; DX 48; Tr. 1615, 1617-18 (Sanford).

B. Costs Paid to Tepa

In September 2008, the Corps issued two sole-source contracts to Tepa to replace the piping system under the dorms and to remedy the site grading. See DX 54; DX 57. The Tepa repair contracts were based upon "Independent Government Estimates" ("IGEs") prepared by the Corps' Cost Engineering and Specification Section ("the Cost Section"). Tr. 1269 (Schmidt). The Cost Section generates IGEs to determine the cost at which a prudent contractor would undertake a project. Tr. 1273 (Schmidt). The Corps certifies an IGE only upon a determination that the price therein is "fair and reasonable." Tr. 1274 (Schmidt).

On September 11, 2008, the Corps issued an IGE for the repairs to the FY03 dorm in the amount of $1,815,820, DX61 at 12, and an IGE for the repairs to the FY04 dorm in the amount of $1,847,797.00, DX 61 at 3; Tr. 1294 (Schmidt). Jack Shelton[7] prepared, and Milton Schmidt[8] certified, the IGEs for the repairs to both dorms. See Tr. 1294, 1298, 1307 (Schmidt). The original IGEs were subsequently revised based upon a change in the scope and type of work required to repair the dorms. See Tr. 1327-28

[7] Mr. Shelton is a cost estimator within the Corps' Cost Section.

[8] Mr. Schmidt is the Chief of the Corps' Cost Section.

(Schmidt). Based upon discussions with Tepa, the major revisions to the IGEs were as follows:

- The method of excavation changed. See Tr. 1331-33 (Schmidt). Mr. Shelton and Mr. Schmidt determined that a vacuum truck, rather than a Bobcat loader, should be used to excavate the tunnels and remove the soils. Id.
- The duration of the project increased from 270 to 330 days. Tr. 1335 (Schmidt).
- The original IGEs did not account for a site engineer and his equipment or for a safety engineer, both of which were determined to be necessary. Tr. 1359 (Schmidt).
- The waste disposal method changed. Tr. 1335-36, 1357-58 (Schmidt). The original IGEs assumed on-site disposal but were revised to include costs for transportation and disposal off-site. Id.
- The revised IGEs added option costs for site grading and drainage. Tr. 1336 (Schmidt).
- The revised IGEs added costs for a storm water waste pollution plan. Id.
- The revised IGEs added costs associated with lighting and ventilation under the dorms. Id.

The Corps issued a revised IGE for the FY03 dorm repairs in the amount of $3,915,211, DX 56, and for the FY04 dorm repairs in the amount of $3,608,581, DX 56A. Based upon the revised IGEs, on September 30, 2008, the Corps issued contract no. W9126G-08-C-0064 to Tepa for the repairs to the FY03 dorm and contract no. W912G-08-C-0071 to Tepa for the repairs to the FY04 dorm. The design-build contracts for the FY03 and FY04 dorms included a base bid and two options for total amounts of $4,400,446 and $3,219,569, respectively. See DX 54; DX 57. Due to subsequent modifications on January 4, 2010, the total amounts were reduced to $4,245,270.75 and $3,069,067.34, respectively. See DX 90; DX 91.

Each contract included a base bid amount for all services necessary to replace the underfloor piping systems, as well as an option to replace the shower pans and an option to correct the site grading. See DX 54; DX 57. The detailed scope of work for the base bid on both contracts required the excavation of tunnels for each wing of the dorms that "ran from one side across, under the building to the other side." Tr. 1004 (Leathers). Another tunnel provided access to the plumbing under the common area where the three wings came together. Tr. 1005 (Leathers). The tunnels allowed Tepa to remove the damaged cast iron piping, replace it with new PVC piping suspended from the floor slab, and provide a void space under the piping so that any future soil heave would not affect the piping. Tr. 1006 (Leathers). The Government's expert, Francis D. Leathers[9] testified

[9] Mr. Leathers is a geotechnical engineering consultant with GEI Consultants.

that this method was the "only practical way to do it, given the nature of the structure." Tr. 1007 (Leathers).

VII. Claim Against BPLW

A Corps board including the chief of construction and chief of engineering ultimately determined that the Government should pursue a claim against BPLW for the costs incurred to repair the dorms. Tr. 1675 (Sanford). Mr. Sanford was tasked with determining which costs within Tepa's contracts were associated with repair of the piping and site grading problems and thus attributable to BPLW. Tr. 1676 (Sanford).

On October 8, 2008, the Government issued a letter to BPLW, claiming that BPLW's failure to account for the expansive soils necessitated the repairs and demanding payment of over $7.6 million. Compl. ¶¶ 32-33. The Corps subsequently brought a formal A-E claim against BPLW for defective dormitory designs. Compl. ¶ 34. The Corps' contracting officer issued a final decision on November 25, 2008, finding that BPLW was negligent in providing a defective MEP design for the sanitary sewer lines and holding BPLW liable for damages in the amount of $7,604,834.11. Id. On October 7, 2009, BPLW filed a petition in this Court, seeking review of the contracting officer's final decision, and requesting the Court to declare the November 25, 2008 decision null and void.

Discussion

The Government's principal contention is that BPLW is responsible for the failure of the underfloor piping system beneath the FY03 and FY04 dorms at Lackland AFB. The Government contends that BPLW breached its Contract with the Corps by providing a negligent underfloor piping design, as well as a negligent civil site grading design. Specifically, the Government contends that BPLW was required, but failed, to provide an underfloor piping design that could accommodate the maximum potential soil heave predicted in the soils reports. Likewise, the Government asserts that BPLW was required, but failed to provide a civil site grading design that complied with the slope requirements set forth in the soils reports and the AEIM. On account of these failures, the Government maintains that it incurred substantial expense to repair and replace the underfloor piping systems and to re-grade the site. The Government seeks a total of $6,755,826.72 in damages from BPLW for the costs it incurred as a result of BPLW's negligent designs.

I. Whether The Government Has Shown That BPLW Breached Its Contract With The Corps

To recover for breach of contract, a party must establish: (1) a valid contract between the parties; (2) a duty arising out of the contract; (3) a breach of that duty; and

(4) damages caused by the breach. San Carlos Irrigation & Drainage Dist. v. United States, 877 F.2d 957, 959 (Fed. Cir. 1989). It is undisputed that BPLW entered into a valid contract (subsequently modified) with the Corps to design the FY03 and FY04 dorms at Lackland AFB. See Stip. ¶¶ 3-5. Moreover, under the Contract, BPLW had a duty to provide design services without negligence. See DX 12 at 105 (incorporating FAR 52.236-23); see also C. H. Guernsey & Co. v. United States, 65 Fed. Cl. 582, 602-03 (2005) (interpreting same provision as imposing duty to provide design services without negligence). The standard of care for evaluating a negligence claim against an A-E is "such care, skill, and diligence as others who are engaged in the profession would ordinarily exercise under similar circumstances." Id. at 595 (internal citation omitted). An act will be deemed negligent if it "'involve[s] a risk which could or should have been foreseen by the actor.'" Id. (quoting Elmore Moving and Storage, Inc. v. United States, 845 F.2d 1001, 1004 (Fed. Cir. 1988)).

The parties dispute whether BPLW provided (a) a negligent underfloor piping design or (b) a negligent civil site grading design. The Court will address each design in turn to determine whether it complied with the applicable standard of care.

A. Whether BPLW's Underfloor Piping Design Complied with the Applicable A-E Standard of Care

1. As Informed by the Soils Reports

The Government claims that BPLW provided negligent design services insofar as its underfloor piping design failed to comply with the applicable A-E standard of care. Def.'s Br. 56. The parties agree that the applicable A-E standard of care requires an MEP engineer to comply with the soils reports when designing a piping system, Stip. ¶ 12; see also Pl.'s Br. 51; Def.'s Br. 58, and that BPLW was contractually obligated to follow the soils reports in preparing the structural and MEP designs for the dorms, Stip. ¶ 11. The parties disagree, however, on what sections of the soils reports apply to the underfloor piping and consequently, what BPLW needed to do to conform to the standard of care.

Based upon the soils reports' prediction that the soil underneath the dorms had the potential to heave over nine inches, the Government contends that BPLW was required to design a plumbing system capable of withstanding over nine inches of heave. Def.'s Br. 58. By contrast, BPLW relies on language in the "Mechanical Connections" subsection of the soils reports ("the MC subsection") to assert that it was required to design a plumbing system that could accommodate only one inch of movement. Pl.'s Br. 52. As set forth below, the Court concurs with the Government's view that the A-E standard of care required BPLW to provide a piping design to accommodate the maximum potential soil heave predicted in the soils reports.

The stated purpose of the soils reports is "to provide subsurface information, and foundation and pavement design recommendations" for the dorms. PX 5 at 1; PX 6 at 1. In line with that purpose, the soils reports provide detailed discussions of the subsurface and laboratory tests conducted by the Corps, as well as foundation and pavement design considerations and recommendations. See generally, PX 5-6. The soils reports contain no explicit guidance concerning piping designs, only what magnitude of movement the designers should expect when placing the pipes. Id.; see also Tr. 94 (Black). What is abundantly clear from the soils reports is that the Corps determined that the soils in the area of the dorms "have a very high shrink-swell potential." PX 5 at 8; PX 6 at 8. The reports explain that "[o]nce built upon, these soils can experience significant volumetric changes when their in situ moisture environment is altered." PX 5 at 8; PX 6 at 9. Specifically, the reports estimate that the "expansive soils have a heave potential of approximately" 235-240 millimeters, or more than nine inches. PX 5 at 8; PX 6 at 8.

Four witnesses called by the Government testified that the A-E standard of care requires a mechanical engineer to provide a piping design capable of withstanding the maximum potential soil heave forecast by the soils report. Tr. 85 (Black) ("I would expect [the mechanical engineer] to design or account for the nine and a quarter inches of vertical movement."); Tr. 222-23, 226 (Branson) ("The full amount of the heave has to be accommodated by . . . the design in some fashion."); Tr. 514 (Focht) ("[T]he mechanical engineer should have taken into account the geotechnical engineering reports' indication that [at least nine] inches of heave . . . should be anticipated and should have included provisions to deal with that in his design."); Tr. 966-67 (Leathers) ("[T]he amount of potential soil heave . . . should be accommodated in the design of the structure.").

They explained that one reason the piping design must accommodate the maximum potential soil heave is because there is no way to control when it will occur. See Tr. 86 (Black); Tr. 514-15 (Focht); 967-68 (Leathers) ("[B]ecause you can't reliably control it you need to accommodate it."). Mr. Focht opined that it would be impossible to prevent water from infiltrating the expansive soil beneath the dorms. Tr. 514. He explained that at the site, there are at least four moisture pathways through which water could infiltrate the soil beneath the dorms and that the depth of the active zone[10] is twenty feet. Tr. 514-15. Under such conditions, to prevent water from migrating in and out of the space beneath the dorms, the system would have to be perfect all the way down to the water table. Id. Such a system, with "no defects[,] . . . [is] very unlikely to occur." Id. Even incorporating grades with a five percent slope around the perimeter of the dorms could not prevent the migration of water through the pathways into the space beneath the dorms. Tr. 520 (Focht).

[10] Mr. Focht explained that the "active zone" is a "zone over which the soil moisture varies with time between a wet condition and a dry condition. When you get below that zone, then you're in a part of the soil profile where the moisture content does not appreciably change over time." Tr. 515.

While it is impossible to control when the maximum potential soil heave will occur, the testimony at trial established that its occurrence is reasonably likely over the life of the buildings. See Tr. 86-87 (Black) (testifying that based upon the soil tests, approximately nine inches of soil heave is a realistic estimate); Tr. 227 (Branson); 518 (Focht). Mr. Focht stated that it is "quite likely in the 50- to 100-year life of the building[s] . . . that you would see that range of movement [over nine inches]." Tr. 518, 555-56. He explained that such movement is likely because San Antonio has significant dry and then wet periods, causing a contraction and then swelling of the soil. See Tr. 519. Similarly, Mr. Branson testified that "the limits that are mentioned in the soils report[s] are to be anticipated as a real possibility of an occurrence, not simply due to something like an earthquake or an act of God, but due to a natural migration of water as it moves through the stratum." Tr. 227, 444.

Another reason the piping design must accommodate the maximum potential soil heave is because the piping design must "work in harmony" with the structural, or foundation, design. Tr. 907 (Leathers). As Mr. Focht explained, because both the foundation and piping systems have direct interaction with the ground, it is "important" to avoid a "situation where the building is behaving in one manner and the plumbing is behaving in a very different manner causing a differential movement between the two." Tr. 496. "[I]f the building is not moving and the plumbing is moving with the soil, then [there is] a potential for formation breaks in the plumbing system." Tr. 496-97 (Focht).

Here, the soils reports dictated that "the presence of a highly active subgrade must be accounted for in the design of the [d]ormitory foundation and floor slab systems to prevent both functional and aesthetic problems within the completed facility." PX 5 at 9; PX 6 at 9. To account for the active subgrade, the soils reports recommended that the dorms be founded on a drilled and underreamed pier foundation with a 12-inch void space below the slab. PX 5 at 9-10; PX 6 at 9-10. Mr. Focht explained that the recommended foundation system prevents the buildings from moving:

> All of the structural loads come down to a series of drilled concrete piers that are embedded at about 35 feet, and so the load carries down through the portion of the soil that's shrinking and swelling, and it is resting down in some materials that don't move. As a result the structure is not moving, so as the soil goes up and down the building is largely staying in place.

Tr. 574. In addition, the 12-inch void space between the bottom of the structure and the soil provides a buffer that prevents the soil from pushing up on the building when it expands. See Tr. 81 (Black). BPLW's structural design followed the soils reports and accounted for the highly active subgrade by calling for a drilled pier foundation on a structural slab over a 12-inch void space. Tr. 82 (Black); Compl. ¶ 18. Given that

BPLW's structural design accommodated the highly expansive soils, BPLW's piping design needed to do so as well to avoid differential movement between the systems. BPLW designed the piping system, however, such that the piping passed directly into the soil with no void space or other allowance for soil movement.[11] Tr. 496-97 (Focht).

BPLW does little to refute the persuasive testimony that the soils are likely to experience the maximum amount of heave or that the structural and mechanical systems need to work together.[12] Instead, BPLW relies on language in the "Mechanical Connections" subsection of the soils reports to maintain that it was required to design a piping system that could accommodate only one inch of horizontal and/or vertical soil movement. Pl.'s Br. 52. The MC subsection provides: "All exterior mechanical connections should be of the flexible type. Flexible connections should be capable of resisting a minimum of 25 millimeters [nearly one inch] of both vertical and horizontal movement. All condensate lines should drain away from foundation edges." PX 5 at 17; PX 6 at 19. Relying on testimony from Mr. Esmond,[13] BPLW contends that "Mechanical Connections" refers to underfloor piping and thus, pursuant to the MC subsection, BPLW was required to provide a piping design to accommodate only one inch of soil movement. See Pl.'s Br. 52; Tr. 2064-66 (Esmond).

A plain reading of the MC subsection does not support BPLW's interpretation that it applies to the underfloor piping. The MC subsection refers to "exterior" connections, PX 5 at 17; PX 6 at 19, and is a subsection of the "Foundation Design Recommendations," PX 5 at 13; PX 6 at 13. A natural reading of the MC subsection is that it is referring to connections "exterior" to the foundation, or the building, and not the piping underneath the building. Three witnesses for the Government confirmed this interpretation. Mr. Black testified that the MC subsection does not refer to the underfloor piping but instead "pertains to [the] exterior of the building." Tr. 90. David Clarke, Chief of the Mechanical Design Section in the Corps' Fort Worth District, testified that the MC subsection "addresses piping connections that are exterior to the building" and "provides no guidance to the underfloor piping design." Tr. 186-87. Finally, Mr.

[11] In Mr. McCleskey's trip report following his site visit in August 2006, he confirmed that "no freedom of movement of the underfloor plumbing was observed during a review of the Contractor's photos," despite the fact that the soils reports "clearly and emphatically stated" that the soils "are very highly expansive . . . at this project site." DX 45 at 9.

[12] BPLW's expert, Mr. Esmond, conceded at trial that the structural design has a large impact on the foundation design. Tr. 2060-61.

[13] Mr. Esmond is an MEP engineer, who provided an expert report and rebuttal reports based upon his review of BPLW's plumbing designs, correspondence, other designs, and site visits. See Tr. 2044-45 (Esmond).

Branson confirmed that the MC subsection does not address underfloor piping connections but instead addresses connections exterior to the building. Tr. 228-30.

In contrast to the aforementioned testimony, the rationale provided by BPLW's expert in support of its interpretation is unavailing. Mr. Esmond testified that "Mechanical Connections" refer to "joints, fittings, and pipe." Tr. 2065. When asked why he believes that the MC subsection applies to the underfloor plumbing in particular, Mr. Esmond responded that it is because it was written by "the geotech[nical engineer] who deals with the underfloor areas of the building" and because the subsection "deals with the horizontal and vertical movement of the earth or the ground material. That's not found in the building." Tr. 2064-65. Mr. Esmond's purported explanation of why the MC subsection pertains to the underfloor piping in particular could be said about every section of the soils reports. The soils reports in their entirety deal with issues in areas under, and not found in, the buildings, i.e., foundation and pavement issues affected by the soils. Other than Mr. Esmond's testimony that "Mechanical Connections" can refer to pipe, BPLW provides no support for its view that the MC subsection pertains to the underfloor piping.

Contrary to BPLW's view, the Court is persuaded that the standard of care required BPLW to design a piping system capable of withstanding the maximum potential soil heave forecast in the soils reports. BPLW concedes that it was contractually obligated to "strictly" follow the soils reports in preparing both the structural and MEP designs for the dorms. Stip. ¶ 11. Given that the soils reports' seminal finding was that the soils beneath the dorms were highly expansive with the potential to heave over nine inches, it would be odd indeed if the soils reports required BPLW's piping design to account for only one inch of movement. In light of the soils reports' explicit finding that the soils had the potential to heave over nine inches, the risk that the soils would do so is one that BPLW should have foreseen. In providing a piping design that failed to accommodate more than nine inches of heave,[14] BPLW provided negligent design services in breach of its Contract with the Corps. See C. H. Guernsey, 65 Fed. Cl. at 596.

2. As Informed By the 1983 Letter

The Government asserts that the applicable A-E standard of care also required BPLW to consult the 1983 letter and to utilize the piping design guidance therein. Def.'s Br. 62. Specifically, the Government contends that the 1983 letter required BPLW to

[14] BPLW concedes that its "plumbing design . . . was not intended to address the maximum possible soil movement." Pl.'s Br. 82. Instead, it maintains that its design allowed for "an inch to an inch and a half of movement where the pipe runs vertical and turns horizontal and four to five inches of movement as the horizontal pipe moves away from the vertical turn." Id. at 52-53.

provide a design that would isolate the pipes from the expansive soil. Id. at 64. For its part, BPLW avers that the Government has not shown that the 1983 letter is part of the Contract. See Pl.'s Br. 20-21. Moreover, BPLW maintains that "[e]ven if the 1983 Letter did apply, the Government did not follow the 1983 Letter." Id. at 21.

a. Whether the 1983 letter is incorporated into the Contract

At the outset, the Court must address the issue—hotly contested by the parties—of whether the 1983 letter is part of the Contract. The Contract's Statement of Work provides that "[t]he project design shall incorporate the . . . technical considerations" found in the "US Army Corps of Engineers, Southwestern Division, Architectural and Engineering Instructions Manual (CESWD-AEIM), *October 1998*." DX 12 at 8 (emphasis added). In addition, the 2000 version of the AEIM provides that "[p]iping designs for underfloor piping in expansive soils will be in accordance with SWDED-G letter [d]ated 29 Sep 1983, ER 1110-345-722," i.e., the 1983 letter. DX 3 at 180. Based upon the Contract's reference to the AEIM and the AEIM's reference to the 1983 letter, the Government submits that the 1983 letter is incorporated into the Contract. Def.'s Br. 62; see also Tr. 162-63 (Black) (testifying that by referencing the AEIM, which in turn references the 1983 letter, his soils report (FY03) incorporated the 1983 letter).

BPLW emphasizes that the Contract specifically incorporated the *1998* AEIM but does not refer to or incorporate the 2000 edition of that document. Pl.'s Br. 20, 32. Moreover, only the 2000 version—not the 1998 version—was offered by the Government, and admitted by the Court, into evidence at trial. Id. at 32; Tr. 88-89; DX 3 at 1. BPLW asserts that "the Government did not present any evidence that proved the contents, attachments, terms or conditions of the 1998 AEIM, including whether or not the 1983 Letter is incorporated into or referenced by the 1998 AEIM that is mentioned in BPLW's contract." Pl.'s Br. 20. As such, BPLW maintains that "the Government has not established that the 1983 letter is a part of BPLW's contractual duties in this case." Id. at 37.

In response, the Government contends that the Contract's reference to a 1998 AEIM was simply a "scrivener's error," as a 1998 version of the AEIM does not exist. Def.'s Rep. 10, 10 n.3. Moreover, the Government maintains that both parties understood that the applicable AEIM was the 2000 AEIM because it was the most up-to-date version when the parties entered into the Contract. Id. at 10-11. In support of its position, the Government emphasizes that during the design phase of the project, a BPLW employee requested the most recent version of the AEIM from the Corps. Id. at 12 (citing PX 26 at 1).

When contract language is unambiguous, the plain language of the contract is controlling. Bristol-Myers Squibb Co. v. United States, 48 Fed. Cl. 350, 355 (Fed. Cl. 2000) (internal citation omitted). If, however, a party makes an arguable claim that a

contract provision contains a latent ambiguity, courts may resort to extrinsic evidence to determine whether a latent ambiguity actually exists. Rogers v. United States, 93 Fed. Cl. 607, 625 (2010) (internal citations omitted). A latent ambiguity is one "that does not readily appear in the language of a document, but instead arises from a collateral matter when the document's terms are applied or executed." Black's Law Dictionary (9th ed. 2009).

BPLW claims that the Contract is "free of any ambiguity," as it expressly refers to the 1998 AEIM. Pl.'s Resp. 3. Accordingly, BPLW argues that the Government cannot use outside evidence "to attempt to contradict the unambiguous terms of the contract." Id. The Government made an arguable claim at trial, however, that the reference to the 1998 AEIM creates a latent ambiguity. Mr. Clarke testified that "[t]here actually wasn't any [19]98 version available." Tr. 2616, 2618. Mr. Clarke explained that his testimony was based upon the fact that "[t]he 2000 version was current at the time of the contract," and the AEIM typically is "updated about every four years." Tr. 2618-19, 2622. Absent a 1998 version of the AEIM, there arises a latent ambiguity as to what version the parties intended to incorporate into the Contract.

While ambiguities are generally construed against the drafting party under the rule of *contra proferentem*, a court will adopt a contractor's interpretation of a latent ambiguity only if its interpretation is reasonable. Travelers Cas. & Sur. Co. of Am. v. United States, 75 Fed. Cl. 696, 711 (2007). Moreover, before applying the rule of *contra proferentem*, a court must determine whether extrinsic evidence resolves the ambiguity. Jayne v. United States, 75 Fed. Cl. 218, 234 (2007) (internal citations omitted). In evaluating the extrinsic evidence, courts must endeavor to effectuate the intent of the parties when they entered into the contract. Praecomm, Inc. v. United States, 78 Fed. Cl. 5, 13 (2007) (internal citation omitted).

Given Mr. Clarke's testimony that no 1998 version of the AEIM exists, BPLW's insistence that the parties incorporated a 1998 version is unreasonable. Rather than insisting on the incorporation of a 1998 version, the evidence demonstrates that the parties intended to incorporate the most recent version of the AEIM.

As a preliminary matter, BPLW was fully aware that its design needed to comply with the AEIM. Both Mr. Black and Mr. Clarke testified that the AEIM is an integral document for an A-E designer. Mr. Black went so far as to call the AEIM "the Bible for . . . an in-house or an A-E designer," as it provides the minimum requirements for a design submittal. Tr. 87. Mr. Clarke confirmed its importance, stating that "the AEIM has been the primary design criteria" for the Fort Worth District for "at least 25 years." Tr. 2616. He testified that he refers to the AEIM every time the Corps designs a project. Id. Demonstrating that BPLW was aware of the applicability and importance of the AEIM, BPLW's recorded minutes from a meeting during the design phase of the project show that a BPLW employee requested a copy of the AEIM. See PX 26 at 1.

Not only was BPLW aware of the applicability of the AEIM, but the evidence also demonstrates that BPLW knew that the most recent version, i.e., the 2000 version, of the AEIM applied to the Contract. The meeting minutes referenced above state that the BPLW employee requested specifically "*the most recent version of the AEIM*." Id. (emphasis added). Moreover, within the "Foundation Design Recommendations," the FY03 soils report provides that "[a] minimum 305-millimeter void should be maintained beneath all grade beams, and the void area shall be protected with concrete retainer blocks as shown *in the latest edition of the SWD-AEIM*." PX 5 at 14 (emphasis added). In line with this view, Mr. Clarke testified that the Corps always consults the most recent version of the AEIM and provides it to the A-Es when they enter into a contract with the Corps. Tr. 2622-23. He submitted further that the current version of the AEIM is maintained on the Corps' website and that the A-E firms are directed to the website whenever they enter into a contract with the Corps. Tr. 2623. BPLW's request for the "most recent version of the AEIM" during the design phase of the project corroborates Mr. Clarke's testimony. See PX 26 at 1.

The parties' conduct at trial reinforces the view that they understood the 2000 version of the AEIM to have been incorporated into the Contract. During the first seven days of trial, counsel for both parties repeatedly referred to the 2000 version of the AEIM (DX 3) without raising the question of whether it was the applicable version. When counsel for the Government moved to admit the 2000 version into evidence, counsel for BPLW objected on the ground that the witness testifying as to its contents was not a records custodian, not on the ground that the 2000 version was inapplicable. The fact that the Contract referenced a purported 1998 version, rather than the 2000 version, of the AEIM did not appear to come to BPLW's attention until the final day of trial; until then, both parties appeared to assume that the Contract incorporated the 2000 version. See Tr. 2615-24. Based upon the foregoing, the Court concludes that the parties intended the most recent version of the AEIM to apply to the Contract.

Once the 2000 version of the AEIM is incorporated into the Contract, the September 1983 letter is incorporated by reference. See Gee & Jenson Eng'rs, Architects, & Planners v. United States, 2008 U.S. Claims LEXIS 504 (filed November 7, 2008); see also Tr. 102-03 (Black) (testifying that the guidance in the AEIM and the 1983 letter is included in the soils reports by reference); Tr. 180 (Clarke) (confirming that the Contract required BPLW to comply with the AEIM and the 1983 letter).

b. Whether BPLW was bound by the 1983 letter to isolate the pipes from the expansive soil

Based upon the 1983 letter's recommendation that the "[w]ater and waste pipes should be supported from the floor system in a localized crawl space . . . [and] [a] void area of 6-inch minimum should be provided beneath the supported pipes," PX 1 at 2, the

Government contends that BPLW had a duty to isolate the piping from the expansive soil, either by incorporating a crawlspace or a void space, Def.'s Br. 63. BPLW maintains, however, that it is not bound by the guidance in the 1983 letter because the Corps violated the provisions of the letter. See Pl.'s Br. 21. BPLW emphasizes that the 1983 letter directs that "[t]he [soils report] should give recommendations for underfloor water and waste pipe treatment and expansive characteristics of the foundation soils." Id.; PX 1 at 1. Because the soils reports did not provide specific recommendations for what to do with the plumbing lines, BPLW contends that the Government did not follow the 1983 letter. Pl.'s Br. 21. The implication is that, in turn, BPLW should not be required to follow it. See id.

Contrary to BPLW's position, the evidence suggests that the Corps was not required to provide specific recommendations for the piping system within the four corners of the soils reports. Both Mr. Black and Mr. Focht testified that it is often the case that guidance for the piping system is contained in multiple documents, rather than only in the soils report. Mr. Black explained that he typically writes addenda to his soils reports, as parties follow up with additional parameters. See Tr. 109. Likewise, Mr. Focht testified that while a recommendation regarding what to do with the plumbing lines "should be made, . . . it doesn't necessar[il]y have to go in a single document." Tr. 543. He went on to state, "I've been involved in a lot of projects where there was actually not a single geotechnical report but rather a series of memoranda and letters and technical guidance provided to various engineering and architectural disciplines as it relates to the design and construction of a project." Id. In fact, when asked whether soils reports give recommendations for the plumbing systems, Mr. Focht replied that "[they] rarely provide that kind of direction." Tr. 183. He explained that this is because the geotechnical engineers that provide the soils analysis typically do not have the knowledge to give recommendations regarding the type or layout of the piping system. Tr. 184.

The position that piping recommendations may be contained in multiple documents is logical in light of the language of the Contract and the AEIM. The Contract states that the project "shall incorporate" the technical considerations in the AEIM. DX 12 at 8. In turn, the AEIM provides that the "[p]iping designs for underfloor piping in expansive soils will be in accordance with [the 1983 letter]." DX 3 at 180. The words "shall" and "will" indicate requirements, and the words "incorporate" and "in accordance with" indicate incorporation. In other words, because the Contract required BPLW to comply with the applicable provisions of the AEIM and the 1983 letter, there was no need for their provisions to be restated in the soils reports.

Finally, the Court questions BPLW's insistence that the Corps was required to spell out within the soils reports specific guidance regarding the underfloor piping system. If the Corps was required to provide such detailed guidance, why did it need to hire BPLW? The Court finds it sufficient that the Corps provided the guidance that it did in the AEIM and the 1983 letter along with the predicted soil heave in the soils reports.

Based upon this guidance, BPLW had a duty to isolate the piping from the expansive soil in a way that would accommodate the maximum potential soil heave predicted in the soils reports. The 1983 letter specifically warned that "a potential problem exists with leakage of water and waste lines . . . when the lines are buried in expansive soil." PX 1 at 1. The 1983 letter noted that the situation had been ameliorated where special precautions had been taken to isolate the utility lines from the expansive soils and specifically recommended the incorporation of a void space beneath the pipes to avoid differential movement. Id. at 1-2. Rather than the Corps failing to provide sufficient guidance, it appears that the Corps' guidance "slipped past" BPLW's mechanical engineers. PX 22. Whether willful or not, BPLW failed to head the warning and guidance set forth in the 1983 letter, as well as the soils reports' prediction that the soil could heave over nine inches, and provided a negligent design in violation of the Contract.

B. Whether the Government Issued a Design Directive that Prevented BPLW from Complying with the Standard of Care

Even if the standard of care, as informed by the soils reports and the 1983 letter, required BPLW to isolate the underfloor piping in order to withstand at least nine inches of soil heave, BPLW claims that the Government prevented it from designing such a piping system. See Pl.'s Br. 54. BPLW's position is based upon its assertion that the Corps issued a "design directive" "prohibit[ing] the use of crawl space foundation systems when the [d]orms were designed." Id. at 68, 76. Without the option of a crawlspace, BPLW maintains that the "only reasonable alternative . . . [wa]s to bury the pipes in the soil." Id. at 54. BPLW concedes that "[u]nder those circumstances, the buried pipes would not be expected to withstand more than nine inches of soil movement." Id. at 66. By eliminating the use of crawlspaces, however, BPLW posits that the Government assumed the risk "if these design specifications ultimately turn[ed] out to be ill-advised." Id. at 68.

As the breaching party, BPLW has the burden to establish that the Corps prohibited BPLW from utilizing crawlspaces in its piping design. See Westfed Holdings, Inc. v. United States, 407 F.3d 1352, 1360 (Fed. Cir. 2005). The Court finds, however, that BPLW's entire argument is premised upon the Corps' issuance of a design directive that has not been shown to exist.[15] See Pl.'s Br. 11, 68; Pl.'s Resp. 1 (stating that "[t]he Government . . . issued a design directive that ultimately required BPLW to bury underground pipes in expansive soil").

[15] BPLW emphasizes that its implied waiver argument "is not based on the Government's review, approval or payment related to BPLW's design, but upon the Government's design directive that precluded BPLW from using the very design [a crawl space] the Government now says it should have used." Pl.'s Br. 76.

In support of its position that the Corps issued a design directive prohibiting the use of crawlspaces, BPLW relies heavily on an affidavit signed by Refugio ("Chico") Fernandez and choice excerpts from Mr. Fernandez's testimony at trial. Mr. Fernandez served as program manager for the Corps' Air Education and Training Center ("AETC") for the design and construction of the FY03 and FY04 dorms. See Tr. 1720-22. Counsel for BPLW met with Mr. Fernandez in November 2011, at which time Mr. Fernandez reviewed and signed an affidavit representing that due to budgetary constraints, the Air Force issued a design directive prohibiting the use of any type of crawlspace for the FY03 and FY04 dorms. Tr. 1734, 1757 (Fernandez); PX 158. At trial, however, Mr. Fernandez so completely contradicted the statements in his affidavit as to render the affidavit and his testimony entirely unreliable.

If anything, Mr. Fernandez's testimony at trial served to undermine BPLW's position that the Air Force prohibited BPLW from using a crawlspace for the FY03 and FY04 dorms. Mr. Fernandez explicitly denied the proposition that the Air Force eliminated the use of a crawlspace at least three times:

> Q. Mr. Fernandez, did you agree that one method of reducing costs in the construction of dormitories at Lackland Air Force Base, including FY03 and FY04 dormitories, was to eliminate crawlspaces under the building and bury the plumbing lines in the subgrade?
>
> A. No, that's not an option.
>
> Tr. 1729 (Fernandez).
>
> Q. . . . . The Air Force imposed a design directive to BPLW for the FY03 and FY04 dormitories that prohibited the use of a crawlspace, any type of crawlspace, on either of the dormitories, correct?
>
> A. I don't think that's correct.
>
> Tr. 1741 (Fernandez).
>
> Q. . . . . Are you aware of any design directive from the AETC that prohibited BPLW from utilizing a localized crawlspace to hang utility pipes?
>
> A. No, no.

Tr. 1755 (Fernandez).

In addition, Mr. Fernandez testified that he did not have any discussions with BPLW or the Corps regarding the design of the underfloor piping systems for the FY03 and FY04 dorms and that there was "definitely" room in the budget for the creation of localized crawlspaces[16] for the FY03 and FY04 dorms. Tr. 1748, 1759. While Mr. Fernandez's affidavit may contradict these statements, Mr. Fernandez's testimony at trial severely discredited the validity of his earlier affidavit.

BPLW provides emails showing that the Corps sought to save money by using 6-inch void spaces, rather than crawlspaces, *but only for the FY01 and FY02 dorms*. See PX 24; PX 32; PX 33. BPLW can point to no similar design directive for the FY03 and FY04 dorms, however. The record includes comments from Mr. McCleskey and Ms. Farrell to the effect that the Air Force communicated that it did not want to use crawlspaces, but neither Mr. McCleskey nor Ms. Farrell had any personal knowledge regarding such communications, see DX 45 at 2 (noting that the geotechnical section was "unaware of this design directive"); Tr. 596-67 (where Mr. McCleskey testifies that he had no personal knowledge of conversations regarding crawlspaces); PX 96 (indicating that Ms. Farrell could not identify who eliminated crawlspaces), and in the case of Ms. Farrell, it is not clear whether she was referring to the elimination of crawlspaces for the FY03 and FY04 dorms or for the FY01 and FY02 dorms, see PX 136 at 1 (referring to an email from Mr. Black that "mentioned the Lackland BCE request[ed] years ago to eliminate . . . crawlspaces"). Such tenuous and vague evidence is insufficient to establish BPLW's defense that it is not liable for its negligent design because it was prohibited from using crawlspaces for the FY03 and FY04 dorms.

C. Whether BPLW's Civil Site Grading Design Complied with the Applicable Standard of Care

In addition to its claim that BPLW provided a negligent underfloor piping design, the Government claims that BPLW provided a negligent civil site grading design. Specifically, the Government maintains that BPLW breached its Contract with the Corps by providing a "site grading design [that] failed to meet the contractual requirements set forth in the soils reports and in the AEIM." Def.'s Rep. 31.

The parties agree that BPLW was contractually obligated to strictly follow the soils reports in preparing its designs. Stip. ¶ 11. The soils reports indicate that "proper drainage is an important design consideration to ensure satisfactory long-term foundation performance." Stip. ¶ 18; PX 5 at 16; PX 6 at 18. Accordingly, the soils reports

[16] Mr. Black explained that a localized crawlspace is just under the pipe itself, rather than a full crawlspace that runs under the entire building. Tr. 154. He further explained that a crawlspace is normally approximately three to six feet tall. Tr. 160-62.

recommend that "[e]xterior grading adjacent to the [dorms] should be sloped away from the structure[s] a minimum of 5 percent for the first 3 meters [approximately ten feet]," "[r]unoff . . . should be adequately discharged away from foundation edges," and "[i]n no case should water to be allowed to pond adjacent to or beneath the building, both during and after construction." Stip. ¶ 18; PX 5 at 16; PX 6 at 18; Tr. 95 (Black). Similarly, the 2000 version of the AEIM provides that for "[t]urfed [a]reas" adjacent to a building, "[o]utside finished grade will slope away from the building at a 5% grade for the first 3 meters." DX 3 at 21. "[I]n areas with highly expansive soil," the AEIM recommends that the "5% grade should be extended to 6 to 9 meters." Id.

The purpose of the positive slope is to move water away from the dorms as quickly as possible. Tr. 96 (Black). In regard to the five percent slope in particular, Mr. Long testified that "water is just going to pond, if [the slope is] flatter than 5 percent." Tr. 816. The concern is that if water is allowed to pond next to the buildings, it could drain or seep underneath them and affect the foundation and underfloor piping. Tr. 96 (Black).

Two witnesses for the Government provided persuasive testimony that BPLW's site grading design did not call for a five percent slope around the perimeter of the dorms. Mr. Long did a comparison to determine whether BPLW's design conformed with the five percent requirement set forth in the AEIM. Id. at 836. In a memorandum addressed to Mr. Sanford and dated November 24, 2008, Mr. Long reported his results, concluding that "in many areas the . . . grade was not designed in accordance with the AEIM." Tr. 837 (Long); DX 67. Regarding the FY03 dorm, Mr. Long wrote that "[t]he designed grade at point 4, which is 6 meters (19.7 feet) from the face of the building, is 0.176 meters (6.9 inches) higher than the AEIM required grade." DX 67 at 7. In regards to the FY04 dorm, Mr. Long wrote that "[t]he designed grade at points 2, 4, and 6, which are 6 meters (19.7 feet) from the face of the building, are 0.277 meters (10.9 inches), 0.293 meters (11.5 inches), and 0.298 meters (11.7 inches) higher than the AEIM required grade, respectively." Id. At trial, Mr. Long reiterated that BPLW's site grading design did not comply with the AEIM because it "did not provide the .3 meter drop outside of . . . the building [or] . . . the 5 percent grade six to nine meters beyond the building." Tr. 837.

Like Mr. Long, Mr. Leathers concluded that BPLW's site grading design did not conform to the AEIM's five percent slope requirement. Using elevation data from BPLW's site grading design, Mr. Leathers computed the designed slope at multiple points around the dorms. Tr. 975-76 (Leathers). Mr. Leathers conceded that at least two-thirds of the points around the FY03 dorm called for at least a five percent slope. Tr. 1245. Nevertheless, Mr. Leathers testified that there were six locations around the FY03 dorm where the site grading design did not meet the AEIM's five percent slope requirement. Tr. 985-86. Likewise, with only one exception, all of the locations he assessed around the FY04 dorm called for a grade of less than five percent. Tr. 978

(Leathers). In addition, Mr. Leathers concurred in Mr. Long's assessment that, per BPLW's design, "the ground surface around the edges of the building was six inches below the floor slab instead of the 12 inches required by the AEIM." Tr. 987.

Confronted with this persuasive testimony, BPLW does not appear to dispute that its site grading design did not call for a five percent slope around the entirety of the dorms. See Pl.'s Resp. 22. BPLW contends, however, that the five percent slope requirement applies only to turfed, but not paved, areas adjacent to the buildings. Id. In support of its view, BPLW highlights the testimony of its expert in civil engineering, Raymond G. Helmer, Jr., who testified that it would be dangerous to design a sidewalk with a transverse slope of five percent because it would get wet and freeze, causing people to slip and fall. Tr. 2419, 2421-22. Mr. Helmer testified that instead, a two to four percent slope would be desirable. Tr. 2422. Thus, BPLW appears to concede that its design did not call for a five percent slope around the entirety of the dorms. BPLW contends, however, that in calling for positive drainage around the perimeter of the dorms, its design met the applicable standard of care. Pl.'s Resp. 22.

Notwithstanding Mr. Helmer's testimony and the fact that the AEIM's five percent slope requirement refers specifically to "[t]urfed [a]reas," the weight of the evidence suggests that BPLW was contractually obligated to provide a site grading design with a five percent slope around the perimeter of the dorms. While the AEIM refers to "[t]urfed [a]reas," the soils reports do not; they simply require that the "[e]xterior grading adjacent to the [dorms] should be sloped away from the structure[s] a minimum of 5 percent for the first 3 meters." PX 5 at 16; PX 6 at 18. Insofar as BPLW's civil site grading design did not call for a five percent slope at all points around the perimeter of the dorms, BPLW provided a negligent design in breach of the Contract.

II. Whether The Government Has Established That Its Alleged Damages Were Caused By BPLW's Negligent Designs

As a result of BPLW's negligent underfloor piping design and negligent civil site grading design, the Government claims that BPLW is liable to it for a total of $6,755,826.72 in repair costs. Def.'s Br. 56. The Government claims that it contracted for, and was entitled to receive, a piping system that would accommodate nine inches of soil heave and a civil site grading design that met the requirements of the soils reports and the AEIM. Id. at 68. Accordingly, the Government's damages claim is based upon the costs it incurred: (1) to repair broken pipes; (2) to replace the piping system with one capable of withstanding nine inches of soil heave; and (3) to remedy the inadequate site grading. Id. at 38; Def.'s Rep. 33.

To recover for breach of contract, the Government must establish not only that BPLW provided negligent designs in breach of the Contract, but also the damages caused by the breach. See San Carlos Irrigation, 877 F.2d at 959. To be recoverable, damages

for breach of contract must be: (1) reasonably foreseeable by the breaching party at the time of contracting; (2) substantially caused by the breach; and (3) shown with reasonable certainty. Ind. Mich. Power Co. v. United States, 422 F.3d 1369, 1373 (Fed. Cir. 2005) (citing Energy Capital Corp. v. United States, 302 F.3d 1314, 1320 (Fed. Cir. 2002)). "To meet the substantial causal factor test, [the Government] must definitively establish a causal connection and show that the mitigation costs flowed 'inevitably and naturally' from the breach." Carolina Power & Light Co. v. United States, 82 Fed. Cl. 23, 42 (Fed. Cl. 2008) (quoting, inter alia, Franconia Assocs. v. United States, 61 Fed. Cl. 718, 747 (Fed. Cl. 2004)), vacated in part on other grounds by Carolina Power & Light Co. v. United States, 573 F.3d 1271 (Fed. Cir. 2009). With these requirements in mind, the Court will address each of the cost items claimed by the Government.

A. Costs to Repair the Broken Pipes

The Government seeks reimbursement for the amounts it paid to CF Jordan and Mustang General Contracting to repair specific broken pipes under the dorms. Specifically:

- The Government seeks $20,988 from BPLW for costs incurred to repair the chilled water line, Def.'s Br. ¶ 122;
- $90,966.73 it paid CF Jordan to repair the broken sewer line under the FY03 dorm, id. ¶ 125; and
- $57,406.65 it paid Mustang General Contracting to repair a second lateral sewer line, id. ¶ 127 (citing DX 48).

The Government maintains that BPLW is liable for the costs paid to repair the chilled water line because the design criteria required a flexible connector, but BPLW's design did not provide for one. Tr. 1421 (Sanford). In addition, the Government maintains that BPLW is liable for the costs to repair the two broken sewer lines because they broke due to the expanding soil, and BPLW's design failed to accommodate the anticipated soil heave. Def.'s Br. ¶¶ 125, 127.

The Government provided persuasive evidence at trial to show that the underfloor piping failures were due to the expanding soils displacing the pipes. Upon reviewing photographs attached to the Rimkus report, Mr. Leathers concluded that the soils had heaved five inches, as demonstrated by the carton forms separating the building floor from the soils having been crushed by that amount. Tr. 961-62; DX 40 at 10. Likewise, looking at photographs attached to the Alderson report, Mr. Branson determined that the soils had heaved six inches based upon the carton forms being crushed by that amount. Tr. 431, 436-38; DX 44 at 3-4. In light of the above, the Court concurs with the Government that "[i]f BPLW had designed a piping system that could accommodate the maximum potential soil heave, as it was required to do, the amount of soil movement that

occurred would not have caused the pipe system's failure." Def.'s Rep. 29. In that way, BPLW's negligent underfloor piping design was a "but-for" cause of the pipe failures.

The question remains, however, whether BPLW's negligent underfloor piping design was the predominant or primary factor that led to the alleged damages. BPLW does not appear to contest that the underfloor piping system failed due to soil heave; however, BPLW avers that the soil heave was the result of CF Jordan's construction errors, which led the soils to become saturated. See, e.g., Pl.'s Br. 82.

In his report, Mr. McCleskey cited the Rimkus report stating that CF Jordan had installed a bent and broken pipe under living units E102-05 in the east wing of the FY03 dorm, an area that experienced piping problems thereafter. DX 45 at 3, 6; Tr. 605 (McCleskey). Moreover, Mr. McCleskey surmised that the moisture coming from that broken pipe could have migrated to living units E106-09, where additional piping failures surfaced. DX 45 at 7. While Mr. McCleskey's report and testimony are based upon a report that was not admitted into evidence—and is thus attenuated at best—the Government should not be permitted to benefit from the fact that the Rimkus report could not be admitted because its author could not testify at trial. After all, it was because the Government belatedly disclosed Mr. Frase as a witness that he could not testify and the Rimkus report could not be admitted. See supra n.5; Order, Dkt. No. 80.

Moreover, in its Post-Trial Brief, the Government concedes that Rimkus determined that a pipe component had been damaged, apparently bent and broken, during installation by CF Jordan. Def.'s Br. ¶ 90. The Government provides no contrary evidence to show that the piping installation was done properly. The Government presented persuasive testimony that the soil would have heaved over nine inches at some point over the life of the dorms. See Tr. 86-87 (Black); 227 (Branson); 518 (Focht). Nevertheless, CF Jordan's apparent construction errors virtually ensured that the piping system would fail in the short term, by releasing moisture into the soils beneath the piping. The Government has the burden to show that BPLW's negligent underfloor piping design was the primary factor that led to the alleged damages. In light of the evidence that CF Jordan installed a broken pipe, contributing to the soils' moisture content and the eventual displacement of the pipes, the Court concludes that the Government has not carried its burden. As such, the Government cannot recover for the costs it incurred to repair the broken pipes.

B. Costs to Replace the Piping System with One Capable of Withstanding Nine Inches of Soil Heave

The Government seeks $5,872,980.87[17] from BPLW for costs associated with replacing the dorms' underfloor piping systems. See Def.'s Br. ¶¶ 170, 186. The Government emphasizes that as the breaching party, BPLW has the burden to prove that the Government's remedial measures were not reasonable. Def.'s Br. 72-73. Moreover, the Government asserts that it has shown both the reasonableness and necessity of its repair costs, Def.'s Rep. at 35, as well as demonstrated with reasonable certainty the costs it incurred to remedy BPLW's negligent underfloor piping design, Def.'s Br. 68.

In order to recover damages, the claimant must make a *prima facie* showing that the repair costs it claims are reasonable.[18] The burden shifts to the breaching party only after the claimant has proven its damages with reasonable certainty and provided the Court with a basis for making a reasonably correct approximation of the damages. See Wunderlich Contracting Co. v. United States, 173 Ct. Cl. 180, 199 (1965); Ind. Mich. Power Co., 422 F.3d at 1376 (emphasizing that the claimant must prove foreseeability, causation, and reasonableness). The amount of damages "may be approximated," but only "if a reasonable basis of computation is afforded." Locke v. United States, 151 Ct. Cl. 262, 267 (1960) (internal citations omitted); see also Wunderlich, 173 Ct. Cl. at 199. In other words, "[c]ertainty is sufficient if the evidence adduced enables a court to make a fair and reasonable approximation of the damages." Locke, 151 Ct. Cl. at 267 (citing Stern v. Dunlap Co., 228 F.2d 939, 943 (1955)). Here, the Government failed to adduce sufficient evidence to show that its claimed repair costs are reasonable or to allow the Court to make a fair approximation of the damages.

The only witnesses who testified at trial regarding the amount of the Government's damages were Milton Schmidt and William Sanford. Mr. Schmidt is the Chief of the Cost Section in the Corps' Southwestern Division, and Mr. Sanford is a civil engineering technician in the construction branch of the Corps' Southwestern Division. Neither witness was designated or accepted as an expert and thus, both offered lay opinion testimony.

[17] The Court arrived at this number by adding together the total costs the Government claimed for repairs to the FY03 and FY04 dorms, as listed in paragraphs 170 and 186 of the Government's Opening Post-Trial Brief and then subtracting the costs the Government claimed for repairs to the site grading, as listed in paragraphs 185 and 198. The Court addresses the costs associated with re-grading the site separately in Section C below.

[18] The Government concedes that it "bears the burden of proving that its costs of repair are reasonable." Def.'s Resp. to BPLW's Mot. for Sum. J., Dkt. No. 97 at 14.

Testimony of a lay witness is admissible only upon a showing that the witness has personal knowledge of the subject matter of the testimony. DataMill, Inc. v. United States, 91 Fed. Cl. 722, 734 (Fed. Cl. 2010) (internal citation omitted). Federal Rule of Evidence ("FRE") 701, which allows a lay witness to testify in opinion form, requires the testimony to be "rationally based on the witness's perception." FRE 701(a). This requirement "effectively incorporates the personal knowledge requirement as a prerequisite to acceptance of opinions by lay persons." DataMill, 91 Fed. Cl. at 734-35. The party offering the testimony must show that the witness "'had an adequate opportunity to observe and presently recalls the observation,' and a 'person who has no knowledge of a fact except what another has told him does not satisfy the requirement of knowledge from observation.'" Id. at 735 (quoting 1 McCormick on Evidence § 10 (Kenneth S. Broun et al. eds., 2006)). "[A] witness may testify to an event or occurrence that he has seen himself, but not one that he knows only from the description of others." Id. (internal citation omitted).

1. Mr. Schmidt

The Government called Mr. Schmidt to testify regarding the Corps' calculation of the IGEs for the work done by Tepa LLC to repair the FY03 and FY04 dorms. The Corps prepares an IGE to show the costs that a prudent contractor would incur during a project, thereby ensuring that the Government does not under- or over-pay for a contract. Tr. 1273-74 (Schmidt).

On September 11, 2008, the Corps issued an IGE for the repairs to the FY03 dorm in the amount of $1,815,820, DX61 at 12, and an IGE for the repairs to the FY04 dorm in the amount of $1,847,797, DX 61 at 3; Tr. 1294 (Schmidt). The Corps ultimately issued a revised IGE for the FY03 dorm in the amount of $3,915,211, DX 56, and for the FY04 dorm in the amount of $3,608,581, DX 56A, to reflect a change in the scope of work on the dorms, Tr. 1327-28 (Schmidt). The revised IGEs were the product of negotiations on September 26, 2008 between Ed Morgan of the Corps and Tepa representatives, who jointly determined that a revised scope of work was necessary. Tr. 1345, 1385-86 (Schmidt); DX 56. Based upon the revised IGEs, the Corps issued two sole-source contracts to Tepa on September 30, 2008 for the repairs to the dorms. See DX 54; DX 57. After a subsequent modification on January 4, 2010, the total contract amounts for the FY03 and FY04 dorms were $4,245,270.75 and $3,069,067.34, respectively. See DX 90; DX 91.

The Government relies on Mr. Schmidt's testimony to assert the reasonableness of its repair costs. Mr. Schmidt's testimony, however, reveals that he lacked personal knowledge of any of the assumptions and calculations underlying the original IGEs; the negotiations leading to the revision of the IGEs; and the assumptions and calculations underlying the revised IGEs. Mr. Schmidt could not provide any of the most basic information about the assumed number of hours for the work, the number of workers

required, the labor rates to be paid, or the tasks to be performed. Instead, Mr. Schmidt's testimony consists primarily of hearsay in the form of conversations he had with Jack Shelton and Ed Morgan, Corps employees who did not testify at trial.

a. The original IGEs

An IGE is based, in part, upon the detailed scope of work, which describes the parameters of a given project. See Tr. 1368, 1370-71 (Schmidt). The cost estimator takes the detailed scope of work and begins the process of pricing to arrive at the IGE. Tr. 1371 (Schmidt). To obtain pricing information, the cost estimator relies primarily on a computer-aided cost-estimating system called "MCACES." Tr. 1278 (Schmidt). In addition to MCACES, the cost estimator refers to "historical data," a separate "H2" unit database, and "local pricing sources." Tr. 1290 (Schmidt). To generate an IGE, the cost estimator makes a series of assumptions and inputs them into MCACES. See Tr. 1379 (Schmidt). The cost estimator cannot simply retrieve a number from MCACES and insert it into the IGE. Id. Instead, it is necessary to have an experienced cost estimator, who can compare the MCACES pricing data with local pricing data and relate that to the construction work at hand to arrive at a sound estimate. Tr. 1289-90 (Schmidt).

Here, the detailed scope of work was prepared by someone (unknown to Mr. Schmidt) in the Lackland Resident Office, along with the Corps' contracting officer, Joyce John. Tr. 1366-67 (Schmidt). Mr. Schmidt could not testify whether Ms. John or the unknown individual determined that the work included in the detailed scope of work was reasonable and necessary. Tr. 1369 (Schmidt).

Then, Mr. Shelton – not Mr. Schmidt – prepared the IGEs based, in part, upon the detailed scope of work, as well as other information and documents supplied by third parties. For example, Mr. Schmidt testified that Mr. Shelton relied on information he gleaned from Bobbi Farrell and Ed Morgan through memos and telephone conversations. Tr. 1372-73. As the principal preparer of the IGEs, Mr. Shelton used MCACES and the other aforementioned resources to generate the IGEs. Mr. Schmidt conceded that he did not know too much about the assumptions that Mr. Shelton made in generating the IGEs. Tr. 1373-74, 1379. To the extent that Mr. Shelton could testify as to some of the assumptions underlying the IGEs, his testimony consisted of hearsay in the form of conversations he had with Mr. Shelton. Tr. 1379-80. The Government provided no other evidence regarding the assumptions Mr. Shelton made in employing the databases; it did not submit pertinent information contained in either MCACES or the H2 unit database. See Tr. 1307-08 (Weger).

Mr. Schmidt reviewed the detailed scope of work and the IGEs prepared by Mr. Shelton and determined that the overhead, home office, profit, and bond costs fell within the expected ranges. Tr. 1311 (Schmidt). Based upon his past experience in cost-estimating, as well as a conversation with Mr. Shelton regarding the assumptions that

went into his estimates, Mr. Schmidt determined and certified that the costs within the IGEs were "fair and reasonable." Tr. 1306 (Schmidt).

Notwithstanding Mr. Schmidt's certification, the Court finds that Mr. Schmidt lacked the requisite personal knowledge to establish the reasonableness of the costs in the original IGEs. It is not enough that the Government provide a witness to say that its costs were reasonable; the Government must demonstrate that this is the case. Mr. Schmidt could not testify regarding the rationale for including certain items in the original scope of work, or even who created it. Likewise, he had limited knowledge as to the assumptions and calculations Mr. Shelton made in preparing the IGEs. In fact, Mr. Schmidt conceded that, in general, rather than his personal knowledge, he relies on others to provide him with information, whether via emails, memos, conversations, or other means, to determine whether an IGE is fair and reasonable. See Tr. 1365. While the Court does not question Mr. Schmidt's competency as Chief of the Cost Section, Mr. Schmidt simply was not the proper witness to testify about the reasonableness of the costs within the IGEs. The Court was not afforded "a reasonable basis of computation" when it could not question Mr. Shelton concerning the assumptions and calculations he made when preparing the IGEs. From the Court's viewpoint, the cost figures provided by the Government are simply "numbers on a page" without any substantiation or support.

b. The negotiations

The two contracts the Corps ultimately issued to Tepa were sole-source contracts, meaning that the Corps negotiated them with Tepa and did not conduct any competitive bidding process before awarding them to Tepa. Tr. 1382-83 (Schmidt). Ed Morgan appears to have been the lead Corps representative during the negotiations with Tepa, which occurred on September 26, 2008. See Tr. 1384-86. Neither Mr. Shelton nor Mr. Schmidt was involved in the negotiations. Tr. 1344, 1391 (Schmidt). During the negotiations, the parties decided to make certain changes to the scope of work. Tr. 1385 (Schmidt). In addition to the major changes listed above, see supra p. 12, Mr. Schmidt testified that the scope of work changed, in part, because the parties decided to create a tunnel beneath the dorms to do the repairs. Tr. 1328. However, as that decision was made during the negotiations between Mr. Morgan and Tepa representatives, Mr. Schmidt was not involved in it. Tr. 1328-30 (Schmidt).

c. The revised IGEs

As a result of the negotiations between Mr. Morgan and Tepa, and the changes in the scope of work, the Corps issued revised IGEs for the dorms. See DX 56; DX 56A. Again, Mr. Shelton – not Mr. Schmidt – prepared the revised IGEs. Tr. 1382, 1390-91 (Schmidt). Mr. Shelton prepared the revised IGEs based upon information regarding the negotiations given to him by Mr. Morgan. Tr. 1391 (Schmidt). Specifically, Mr. Shelton relied upon a price negotiation memorandum, which included information regarding the

increased duration of the project and the addition of the site grading option. See Tr. 1337-41 (Schmidt); DX 87; DX 92.

Because Mr. Shelton prepared the revised IGEs, Mr. Schmidt could not testify as to the information that Mr. Shelton put into MCACES to generate the costs in the revised IGEs. Tr. 1393 (Schmidt). Mr. Schmidt conceded that he did not calculate the numbers written into the revised IGEs, those on the IGE summary page, or even the total contract price. Tr. 1389. Mr. Schmidt did not participate in the analysis for arriving at the $50,000 figure for removal costs. Tr. 1387 (Schmidt). He *assumed* the costs for the structural and geotechnical engineers were added together to come up with the $15,000 figure in the revised IGEs, Tr. 1388-89 (Schmidt), and likewise, appeared to assume that the geotechnical and structural testing costs were included in the $115,000 figure for "AM" costs, Tr. 1353-54 (Schmidt). Mr. Schmidt testified that the unit costs in the IGEs were Mr. Morgan's figures from the unit price database, but he could not testify otherwise regarding how the unit prices were determined. Tr. 1393-94 (Schmidt). He also could not testify as to whether Tepa subtracted costs from its overhead for savings due to the project being onsite. Tr. 1396 (Schmidt). Mr. Schmidt could not even break down the details of the revised IGEs to explain what portions were his work product or that of Messrs. Morgan or Shelton. Tr. 1392-93 (Schmidt).

Mr. Schmidt was able to identify and break down some of the costs within the revised IGEs, such as the labor costs for the project superintendent, equipment costs for pickup trucks, direct costs to rent an office trailer, and a Storm Water Pollution Prevention Plan. See Tr. 1346-53 (Schmidt). As detailed above, however, there were significant gaps in his knowledge of the calculations and assumptions underlying the figures in the revised IGEs. Despite the gaps in Mr. Schmidt's knowledge regarding the assumptions underlying the revised IGEs, he approved them, Tr. 1392 (Schmidt), certifying that the costs contained therein were "fair and reasonable," Tr. 1362-63, 1374 (Schmidt). Mr. Schmidt approved the revised IGEs based upon his conversations with Mr. Morgan, a copy of the original IGEs marked up by Mr. Morgan,[19] a price objective memorandum and a price negotiation memorandum, and copies of the revised IGEs provided to him by Mr. Shelton. Tr. 1343, 1346, 1360, 1383-85 (Schmidt); DX 87; DX 92.

On the whole, the weaknesses in Mr. Schmidt's testimony render it woefully insufficient to allow the Court to assess whether the costs reflected in the revised IGEs are reasonable. As an initial matter, the Court questions whether the revised cost estimates were truly "independent." Mr. Schmidt conceded that as part of the

[19] Mr. Schmidt's testimony indicates that the numbers in the original IGEs were crossed out and revised numbers were written in, see Tr. 1388-89 (Schmidt), seemingly by Mr. Morgan as a result of his negotiations with Tepa, see Tr. 1390 (Schmidt).

determination of whether costs are fair and reasonable, the cost estimator does not consider the method of contracting. Tr. 1290, 1383. This is particular noteworthy because the Corps made significant upward adjustments to the IGEs after the price negotiations with Tepa. After incorporating the revisions, the total amounts of the IGEs for the FY03 and FY04 dorms increased from $1,815,820 and $1,847,797 to $3,915,211 and $3,608,581, respectively. Compare DX 61 at 12, with DX 56, and DX 61 at 3, with DX 56A; see also Def.'s Br. ¶¶ 133-34, 141-42. Because the awards to Tepa were sole-source contracts, without any competitive bidding, the Court cannot assume the reasonableness of the contract prices.

Moreover, the second- and third-hand character of Mr. Schmidt's testimony makes it largely unhelpful. Because Mr. Schmidt was not involved in the negotiations leading to the revisions, he could provide only a second-hand description of the changes in the scope of work, rather than details concerning the negotiations and how the decisions to alter the scope of work were made. Likewise, Mr. Schmidt did not prepare the revised IGEs, so he could not testify as to the calculations and assumptions underlying them. It is evident that Mr. Schmidt's testimony is not based upon his own personal knowledge. As a result, it cannot serve as a predicate for a determination that the Government's repair costs were reasonable.[20] See DataMill, 91 Fed. Cl. at 734 (noting that where a witness testifies on matters "with which he has no familiarity," it is "of no use to the trier of fact and . . . waste[s] everybody's time.") (internal citations omitted).

2. Mr. Sanford

Mr. Sanford, who had been tasked by the Corps with determining which costs associated with Tepa's repair work were attributable to BPLW, Tr. 1607 (Sanford), testified about his work at trial. However, as with Mr. Schmidt, testimony, the Court finds Mr. Sanford's testimony of marginal utility.

To make his determination, Mr. Sanford primarily relied on the Tepa contracts but also considered the government estimates. Tr. 1607, 1623 (Sanford). He then created a memorandum, identifying the costs he deemed attributable to BPLW. Tr. 1650-51 (Sanford); DX 71. The costs included those for: designing a crawl space; excavating beneath the dorms to remove the broken piping and replace it with a new piping system; metal to hang the pipe; replacement of the piping; electrical work; Tepa's labor burden; Tepa's home office overhead; Tepa's profit; Tepa's builders' risk insurance and general liability insurance; Tepa's bond costs; final as-built drawings; shower pans; site work; curbing; and metals. See Tr. 1653-63 (Sanford); DX 71.

[20] Insofar as the Government relies on Mr. Schmidt's testimony to establish the reasonableness of its costs to remedy the site grading, the Government has not only failed to show that BPLW's design caused the improper site grading, see infra Section C, but it also has failed to establish that the damages it claims for the site grading are reasonable.

BPLW makes much of the fact that Mr. Sanford is not a plumbing engineer and had no role in determining whether BPLW was liable for the repair costs, as that determination was made by a separate board. See Pl.'s Br. 89-90; Tr. 1672-75 (Sanford). On those bases, BPLW maintains that Mr. Sanford is unqualified to decide which costs should be attributable to BPLW. See Pl.'s Br. 89-90. The Court merely views Mr. Sanford's testimony on that front as duplicative of its own responsibility to determine which costs are attributable to BPLW due to its negligent designs. The Court finds Mr. Sanford's testimony deficient for another reason: as with Mr. Schmidt, Mr. Sanford's testimony does not aid the Court in determining whether the amounts paid to Tepa for the repair work were reasonable.

Mr. Sanford essentially reviewed the Tepa contracts and allocated component costs to BPLW based upon a board's determination that BPLW was liable for certain damages. Tr. 1677-79 (Sanford). Like Mr. Schmidt, however, Mr. Sanford was not privy to the negotiations, which resulted in the revised IGEs and ultimately, the contract awards to Tepa. Tr. 1682 (Sanford). Mr. Sanford did not assess whether the work within the detailed scope of work was reasonable or necessary. Tr. 1683 (Sanford). Moreover, Mr. Sanford did not observe any of the repair work being done by Tepa. Tr. 1680-81 (Sanford). Accordingly, he had no knowledge regarding whether the repair work by Tepa conformed to the scope of work. Tr. 1683 (Sanford).

In sum, through the testimony of Mr. Schmidt and Mr. Sanford, the Government provided insufficient evidence to show that its repair costs were reasonable. As such, the Government has failed to show that it is entitled to the damages it claims for the repairs associated with the replacement of the piping system and the remedial site grading.

C. Costs to Remedy the Inadequate Site Grading

The Government has shown that BPLW provided a negligent civil site grading design insofar as the design failed to meet the slope requirements set forth in the soils reports and the AEIM. As a result, the Government seeks reimbursement for $340,592 of the costs it paid for remedial work to the site grading. See Def.'s Br. ¶¶ 185, 198. The Government contends that BPLW is liable for its deficient site grading design regardless of how the grades were ultimately constructed. See id. ¶ 108. The Government maintains that "even if it were true that the construction contractor failed to grade the site in accordance with BPLW's design, it does not relieve BPLW of liability for failing to produce a civil site grading design that complied with the Soils Reports and AEIM." Id. The Court disagrees.

As noted above, in addition to showing that BPLW breached the Contract, the Government must show that BPLW's breach caused the alleged damages. See San Carlos Irrigation, 877 F.2d at 959. As this Court has stated, "design compliance is 'an

essential element' in evaluating a claim for 'negligently preparing defective plans and specifications." C. H. Guernsey, 65 Fed. Cl. at 596 (internal citation omitted). If a claimant cannot show that the contractor actually complied with the purportedly negligent design, it cannot show that the design caused the damages alleged.

By its own admission, the Government cannot show that CF Jordan initially constructed the grades in accordance with BPLW's design and thus, that the negligent design led to the improper grades and pooling of water. See Def.'s Br. ¶ 109. The Government has no as-built data to show how CF Jordan initially constructed the grades, see Tr. 2426-27 (Helmer), and no witnesses testified as to the as-built condition of the site grading, see Pl.'s Resp. 18; Def.'s Rep. 30. As the Government notes, while CF Jordan completed dorm construction in August 2005 and November 2006, the earliest report concerning the site grading—Ng's report—was based upon a topographical survey conducted in late 2007. See Def.'s Rep. 30 n.7 (citing DX 45 at 3). Mr. Long did not visit the site until November 2007, and Mr. Helmer did not visit the site until 2009. Id. Given the lack of information regarding the as-built grades, the Government takes the position that "the Ng data shed no light on whether the construction grades matched the design grades because the grades may have changed after construction due to soil movement." Def.'s Br. ¶ 109 (citing Tr. 1233 (Leathers)). While the Court questions whether the grades could have changed so drastically over a one- to two-year period, the fact remains that the Government cannot carry its burden to show that CF Jordan complied with BPLW's design.

In contending that contractor compliance is irrelevant, the Government emphasizes that "in many locations the actual grades by Ng were steeper than those called for in BPLW's design." Id. At trial, Mr. Leathers provided support for this view. Specifically, based upon data from the Ng's report, he found that all six points measured around the FY03 dorm revealed grades at steeper slopes than that stipulated in BPLW's designs. Tr. 991 (Leathers). Of the seven survey points around the FY04 dorm, Mr. Leathers found that four were steeper than those called for in BPLW's designs, while three were the same or less. Tr. 992 (Leathers). Overall, after reviewing the Ng survey data, Mr. Leathers concluded that the slope at the majority of locations (10 of 13) around the dorms was steeper than those called for in BPLW's site grading design. Tr. 992-93.

Nevertheless, as noted, the Ng data was obtained more than two years after CF Jordan constructed the dorms. The Government itself undercuts the relevance of the Ng data by maintaining that the grades could have shifted over that two-year period. Moreover, Mr. Leathers' testimony shows that there were at least some locations where the slope was not as steep as that called for in BPLW's design. If the Government seeks to have the Court rely on the Ng data where it suggests that CF Jordan more than complied with BPLW's site grading design, the Court also must rely on the Ng data where it suggests that CF Jordan failed to comply with BPLW's site grading design.

Finally, although the Court does not have before it definitive data regarding the as-built condition of the site grading, the weight of the evidence suggests that CF Jordan constructed the grades at a slope flatter than that provided for in BPLW's civil site grading design. It is undisputed that BPLW's site grading design called for "positive slope" around the perimeter of the dorms. See Def.'s Br. ¶ 107 (citing Tr. 1233 (Leathers)). Yet, multiple witnesses testified to the fact that they observed ponding and pooling of water in the area surrounding the dorms.[21] See Tr. 821 (Long) (testifying that when he visited the site, in late 2007, he observed pooling around the FY04 dorm); Tr. 599 (McCleskey) (same). Mr. Leathers conceded that where there is pooling of water, "it means that . . . there is not positive drainage." Tr. 1233. Again, while there is no definitive evidence of the as-built grades, the weight of the evidence indicates that CF Jordan failed to comply with BPLW's site grading plan. In fact, while the Government appears to have backed away from its earlier stipulation, it initially stipulated that "CF Jordan failed to grade the site with positive grading and drainage to carry water away from the building." Stip. ¶ 25.

Based upon the foregoing, the Government has not shown that CF Jordan complied with BPLW's site grading design and thus, that it was BPLW's negligent design, rather than CF Jordan's improper site grading, that caused the ponding and pooling of water that contributed to the soil heave. As such, the Government cannot recover the costs it claims for remedying the inadequate site grading.

D. Costs to Implement the Modifications to BPLW's Underfloor Piping Design

Lastly, the Government seeks reimbursement for the $197,596.47 it spent to implement BPLW's modified piping design. Def.'s Br. ¶ 117. As set forth above, after BPLW's mechanical engineers "discovered" that the soils beneath the dorms had a high "shrink swell potential," it informed the Corps that it would need to modify its design. PX 22. Mr. Bray confirmed that BPLW recommended the modifications that the parties ultimately adopted. See Tr. 2347-49, 2351-52. Thereafter, the Corps provided CF Jordan with immediate funds and a notice to proceed in order to avoid additional costs associated with construction delays. Def.'s Br. ¶ 116; DX 28; PX 27 at 2; PX 70 (P00003).

It is undisputed that it was BPLW's responsibility to provide the underfloor piping design for the project. See Stip. ¶ 7. It is also undisputed that BPLW was required to provide a design complying with the soils reports, which found that the soils beneath the dorms had "a very high shrink swell potential." Stip. ¶¶ 11, 17. The evidence indicates that BPLW initially failed to use any means to accommodate the expansive soils because the fact that the soils were highly expansive "slipped past" BPLW's mechanical

[21] The Government also stipulated to the fact that "CF Jordan allowed post-rain ponding and pooling of water around the foundation perimeter during construction." Stip. ¶ 23.

engineers. PX 22; Tr. 2375 (Bray). Upon realizing its oversight, BPLW suggested modifications to accommodate the expansive soils. See PX 22.

As a result, the Government incurred additional costs to pay for the more expensive cast iron pipe and the new pipe layout. See PX 28 (estimating a price difference of $173,201—not including CF Jordan's overhead and profit—for the new layout and use of cast iron pipe, which the contractor estimated to be three times the cost of PVC pipe). While the Government may have received a higher grade piping system as a result, BPLW still failed to provide a non-negligent design. The Government suffered damage—in the form of increased costs—for a piping system that continued to be negligently designed. Essentially, BPLW's negligence caused the Government to needlessly incur these costs because the changes had no material effect on improving the design. These costs are recoverable.

Moreover, the Government's damage claim for the increased costs is reasonable. Based upon the communications between Mr. Bray and Ms. Farrell, it is apparent that BPLW viewed the changes as necessary modifications of its design. See PX 22. In addition, given that BPLW recommended the means by which to modify its design, BPLW must have viewed the means as reasonable. See id.; Tr. 2347-49, 2351-52 (Bray). Lastly, by providing CF Jordan with immediate funds and issuing the notice to proceed, the Government made reasonable efforts to mitigate damages that could have increased on account of delays. See DX 28; PX 27 at 2; PX 70 (P00003). Based upon the foregoing, the Court concludes that the Government is entitled to the $197,596.47 in costs it incurred to implement the modifications to BPLW's design.

Conclusion

As set forth above, the Government has shown that it is entitled to recover the costs it incurred to implement the modifications to BPLW's piping design. The Government is not entitled to recover the costs associated with the repairs of the broken pipes; the replacement of the underfloor piping systems; or the re-grading of the site. Pursuant to Rule 54(d), BPLW as the prevailing party is entitled to recover its reasonable costs.

IT IS SO ORDERED.

s/Thomas C. Wheeler
THOMAS C. WHEELER
Judge